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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/745,705	12/21/2000	Lawrence D. Wong	42390P9859	9709

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EXAMINER
VU, HUNG K

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 08/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/745,705	Applicant(s) WONG, LAWRENCE D.	
	Examiner Hung K. Vu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-25* is/are pending in the application.

4a) Of the above claim(s) *11-23 and 25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (PN 6,297,554, of record) in view of Jun (PN 5,900,072).

Lin discloses, as shown in Figure 8, a process comprising,

forming a first dielectric layer (60) on a substrate (52,54,not shown), wherein the first dielectric layer has a dielectric constant;

patterning the first dielectric layer such that a plurality of vertically oriented posts (60) are formed, the post having a top surface;

forming a second dielectric layer (82) over and adjacent to the posts, the second dielectric layer having a top surface and substantially filling up the area adjacent to the posts, wherein the second dielectric layer has a dielectric constant, the dielectric constant of the first layer being higher than the dielectric constant of the second layer;

wherein the plurality of vertically oriented posts are used to provide mechanical reinforcement of the second dielectric layer;

polishing the second dielectric layer such that its top surface is substantially even with the top surfaces of the posts;

forming an inlaid metal interconnection in the second dielectric layer.

Lin does not disclose the second dielectric layer making up the bulk of an inter-layer dielectric material. However, Jun discloses a plurality of vertically oriented posts (3) and a second dielectric layer (5) making up the bulk of an inter-layer dielectric material. Note Figures 1A-1C, 2E, and 3F of Jun. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second dielectric layer of Lin as the bulk of the inter-layer dielectric material, such as taught by Jun in order to further reduce the RC time delay effect between the adjacent conductive layers.

With regard to claim 2, Lin and Jun disclose the substrate comprises a dielectric material.

With regard to claim 3, Lin and Jun disclose the substrate is a material selected from the group consisting of silicon carbide, silicon nitride, and carbon doped oxides of silicon.

With regard to claim 4, Lin and Jun disclose the process further comprising curing the second dielectric layer.

With regard to claim 6, Lin and Jun disclose the process further comprising forming dual damascene openings in the second dielectric layer.

With regard to claim 7, Lin and Jun disclose forming the first dielectric layer comprises depositing an oxide of silicon.

With regard to claim 8, Lin and Jun disclose forming the second dielectric layer comprises chemical vapor deposition of a low-k material.

2. Claims 5, 9, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (PN 6,297,554, of record) in view of Jun (PN 5,900,072) and further in view of Cho et al. (PN 6,140,252, of record).

With regard to claim 5, Lin and Jun disclose all of the claimed limitations except the process further comprising aging the second dielectric layer. However, Cho et al. discloses a process comprising forming a dielectric layer (28) and aging the dielectric layer. Note Figure 1D and Col. 5, lines 27-32, of Cho et al.. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to form and age the dielectric layer of Lin and Jun, such as taught by Cho et al. in order to remove the solvent from the pores.

With regard to claim 9, Lin and Jun disclose all of the claimed limitations except forming the second dielectric layer comprises spinning on a low-k material. However, Cho et al. discloses a process of forming a dielectric layer (28) comprises spinning on a low-k material. Note Figure 1D ad Col. 5, lines 6-26 of Cho et al.. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to form the second dielectric layer of Lin and Jun comprises spinning on a low-k material, such as taught by Cho et al. in order to improve the gaps filling between the structures.

With regard to claim 24, Lin discloses, as shown in Figure 8, a process comprising,

depositing a silicon nitride layer (54) on a wafer (not shown);

depositing an insulating layer (60) over the silicon nitride layer, wherein the insulating layer has a dielectric constant;

patterning the insulating layer such that a plurality of structures are formed, the structures each having a top surface;

depositing a dielectric material (82) over and adjacent to the structure, wherein the dielectric material substantially fills out the area adjacent to the structures and wherein the dielectric material has a dielectric constant, the dielectric constant of the insulating layer being higher than the dielectric constant of the dielectric material;

polishing the dielectric material such that a top surface thereof is substantially even with the top surfaces of the structures;

forming an inlaid metal interconnection in the dielectric material.

Lin does not disclose the second dielectric layer making up the bulk of an inter-layer dielectric material. However, Jun discloses a plurality of vertically oriented posts (3) and a second dielectric layer (5) making up the bulk of an inter-layer dielectric material. Note Figures 1A-1C, 2E, and 3F of Jun. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second dielectric layer of Lin as the bulk of the inter-layer dielectric material, such as taught by Jun in order to further reduce the RC time delay effect between the adjacent conductive layers.

Lin and Jun do not disclose the dielectric material is a porous dielectric material. However, Cho et al. discloses forming a porous dielectric material (28) having a void fraction and treating the

porous dielectric material. Note Figure 1D and Col. 3, line 5 – Col. 6, line 5 of Cho et al.. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to form the dielectric material of Lin and Jun as a porous dielectric material, such as taught by Cho et al. in order to further decrease the capacitive coupling or crosstalk between the conductors and to increased the void fraction.

Response to Arguments

3. Applicant's arguments filed 05/24/02 have been fully considered but they are not persuasive.

It is argued, at page 8 of the Remarks, that the posts in Lin are not used to provide mechanical reinforcement as do the posts in the presently claimed invention. This argument is not convincing because Lin teaches the same post structures, therefore, it is inherent that the posts of Lin would provide mechanical reinforcement.

It is argued, at page 8 of the Remarks, that Lin does not disclose the formation of inlaid metal interconnection in the second dielectric layer takes place after CMP. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., takes place after CMP) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant's arguments with respect to claims 1 and 24 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

August 1, 2002

Tom Thomas

TOM THOMAS
SUPERVISORY PATENT EXAMINER
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